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## Injury surveillance as a distributed system of systems

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The contemporary definition of surveillance is

The ongoing systematic collection, analysis, and interpretation of health data essential to the planning, implementation and evaluation of public health practice, closely integrated with timely dissemination of these data to those who need to know. The final link the surveillance chain is the application of these data to prevention and control.<sup>1</sup>

In 2008, Professor Pless wrote an excellent criticism of modern injury surveillance in a commentary in this Journal; *Surveillance alone is not the answer*.<sup>2</sup> The main point of the commentary was in his observation that,

I question whether there is any evidence that a surveillance system—even one that operates perfectly—actually contributes to prevention. .... Surveillance is sterile and pointless if it is not somehow tied to preventive interventions.

There are three ways for injury surveillance to fail the ‘Pless test’. The first way to fail is by not getting the right information into the right hands in a time and matter that allows data to be used for prevention programmes. The second way to fail is to spend ones resources looking for data, when data is not what is needed to solve the problem. Not recognising this distinction in circumstances where the second case holds true, can create accelerated efforts to collect “more and better” data in a vain attempt to improve injury outcomes, when the resources should be better applied elsewhere. The third way to fail the test as originally stated is an inevitable consequence of the wording of the challenge. An injury surveillance system could clear the first two hurdles yet still fail if data translation and implementation are outcomes for which the surveillance system is being held accountable.

During the life time of many contemporary injury surveillance systems, the world has entered the digital age. The purpose of this supplement is to examine whether advances in Information and Communications Technology, and the dramatic escalation of use of this

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technology that has occurred since publication of Professor Pless' commentary, have transformed our understanding of the term "injury surveillance" and made redundant some questions we have had of them. Specifically, we set out to determine whether there has been a shift from thinking about surveillance systems in terms of 'form' (discrete programmes of work, designed to systematically collect, analyse, interpret and apply data for the purposes of injury prevention)<sup>1</sup> to thinking about them in terms of 'function'. Has the digital age recreated injury surveillance as a distributed system of information systems that practitioners can use, opportunistically, to integrate data from multiple unconnected sources to support the wide ranging and changing needs of contemporary injury prevention practice.

There is no inherent value in the existence of an entity responsible for collecting data about injury; only a value in the purpose it has been established to serve. Hence, it is critically important first to be absolutely clear about the purpose of surveillance, before we are able to develop the best means of achieving it. Form should follow function, and not the other way round. The primary needs for injury surveillance is to allow people from across the spectrum of injury prevention and control to answer their questions about (a) the nature and extent of the problem and the distribution of these injuries by relevant categories (time, person, place, severity, activity, location, mechanism); (b) priorities for action, (including burden, opportunity and cost) and (c) provision of preventive services, (including availability, quality, and the process, impact and outcome measures).

There are a multitude of different conditions covered by the term 'injury', and an almost infinitely wide variety of circumstances and factors involved in the injury events that are the target of interventions. Is it reasonable to expect a dedicated injury surveillance system to be able to amass sufficiently detailed data, across all injury conditions, at a sufficient level of accuracy, and then process this data and feed it back in a timely manner to all relevant users in a way that compels the use of this data in real time preventive activities and decisions? Is it reasonable to expect a dedicated injury surveillance system resourced to collect analyse and interpret data to close the loop, so there is the application of data to prevention and control?

On the other hand, the amount of existing information about areas relevant to injury outside dedicated surveillance system is almost limitless. Since 2008, we have seen increased use of novel data and data sources (including social media), real time data access, big data, visualisation, predictive analytics, electronic health records, data linkage, and data from remote sensors and wearable devices. These systems all provide opportunities to obtain data, not initially envisaged as injury data, but nonetheless data which cover (and broadens) the territory within which injury prevention practitioners are active.

Furthermore, it has been long established that the 'push' approach to providing people with health education data, in itself, has little effect on changing injury rates in populations. In the non-injury world, it appears that the new technologies have provided us with a potential new way of operating that overcomes the data-to-action block. There is clearly a willingness for people to 'pull' data when they are ready, and in the form they need it, for incorporation into the real-time decisions. This shift from 'push' to 'pull' is a shift in responsibility from the data collection-focused reason to publish data to a user-focused reason to collect data. The

challenge we face now may not be how to set up and maintain useful, discrete systems that collect comprehensive data on injuries. Rather, the new challenges may be how to facilitate injury prevention practitioners to harness the existing information they need from whatever source, make sense of what they retrieve, and incorporate the complexity and uncertainty of the resulting information into their prevention practice.

What are the new technological tools, their respective uses, strengths, weaknesses, and what opportunities do they offer the field of injury? There is no stocktake yet in the published literature that answers these questions. This supplement was envisaged as a way to start to bring together a discussion about where injury surveillance is heading. In providing this focused discussion, it is hoped we can bring forward advances in injury surveillance, and thus ultimately improve the health and well-being of the population.

## References

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